THE IMPORTANT ROLE OF DISTANCE EDUCATION IN ASTRONOMY

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In distance education the student is remote from the university or college. Education is through a mixture of media; the *specially prepared* printed text is usually the main medium, with audiovisual media also prominent. There are usually no lectures, though there will normally be some tutor contact, and perhaps a short residential school. Student assignments throughout the year plus an end-of-course examination are the norm. Distance education is NOT unguided self study. It is essential that considerable effort goes into preparing the course materials, and in providing support and guidance that works at-a-distance at reasonable cost.

There are now about thirty universities around the world devoted entirely to distance education, and many of these are national institutions. In addition a larger number of conventional institutions have some distance teaching activity. The UK Open University was the first major distance teaching university; it was established in 1969. In 1994 it introduced an introductory astronomy course that constitutes 8% of an honours science degree, that can alternatively be taken as a stand-alone certified course. [For further details about the UK Open University astronomy course, contact the author. One component of the course, all of the colour images (about 200), is separately available: *Images of the cosmos*, B.W. Jones et al., OU/Hodder and Stoughton 1994, ISBN 0 340 60065 9.]. Nearly 2000 students applied to take the course in 1994, and a similar number have applied for 1995. We can"only" admit 1150 students, but this is more than the total of all the other students in the UK taking astronomy at science degree level!

Why is distance education important in astronomy? The importance of distance education is that

- it reaches people who are unable to attend courses that require frequent attendance at a university or college: people can work at home, and they need not study full-time
- a course can reach a very large number of students (witness our experience, outlined above) and so a small number of astronomers in a country, or region, is no bar to mass education in astronomy, at school, college, or degree level
- the costs per student can be low.

It is important to remember that, though students at-a-distance have some support, the extent of this is not nearly as great as at conventional institutions. Therefore, particularly at first and second year levels, normal text books, even with a study guide, will rarely be suitable. Texts have to be specially prepared in order to cater for the needs of students who have little support by way of tutor/lecturer/peer contact. In particular

• the texts have to include detailed instructions about how to engage with the various course components, including the texts themselves

• the texts have to provide pacing

• the sequence of topics has to be prepared with great care, and it is essential to specify clearly and completely the knowledge and skills that students are expected to bring to the course

• the texts have to be "student-active", for example by providing in-text questions that enable the students to check their understanding - full answers plus advice must be given for these questions.

Distance education is already playing a role in astronomy, not only through the UK Open University, but also in France and elsewhere. However, the full potential of distance education in bringing astronomy, at all levels, to large numbers of people, has barely begun to be exploited. There is a golden opportunity here.

TEXTBOOKS AND ELECTRONIC MEDIA

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1. Textbooks. Over the last few years, U.S. textbooks for the survey course have become increasingly sophisticated in the use of color diagrams and photographs and in the availability of supplemental material. This type of course is by far the largest exposure of astronomy to American students, with enrollments of over 200,000 per year. The increasing cost of preparing the books and auxiliary packages has led to many authors and publishing houses bringing out both higher and lower level books, with different lengths and different levels of mathematics.

Some 15 authors (or sets of co-authors) have brought out two dozen different textbooks with current copyrights (1993, 1994, or 1995), including (with publishers in parentheses): Thomas T. Arny (Mosby), Eric Chaisson and Steve McMillan (Prentice-Hall), Sune Engelbrekston (Brown), William K. Hartmann (Wadsworth), William H. Jefferys and Robert R. Robbins (Wiley), James B. Kaler (HarperCollins), William J. Kaufmann III (Freeman), Karl F. Kuhn (West), Dinah L. Moché (Wiley), David Morrison and Sidney Wolff (Saunders; one book includes the late George Abell), Jay M. Pasachoff (Saunders), Michael A. Seeds (Wadsworth), Theodore P. Snow (West), and Michael Zeilik (Wiley). A table with lists and addresses is available on request.

Free supplements given to adopters of class-sized numbers of copies include special magazine or newspaper supplements, overhead transparencies of artwork and photographs, slide sets of artwork and photographs, videotapes, videodiscs, and